

SCIENCE

FRIDAY, JUNE 8, 1888.

SCIENCE CAN FAIRLY CLAIM the honor of having placed the discussion concerning the New York public-school system on the proper basis. The task of educating public sentiment has now been undertaken by one of the most influential journals of the metropolis,—the *Sun*; and in the forefront of its discussion, serving almost as the text for what follows, stands our editorial comment of two weeks ago. Educators in all parts of the country are following the discussion in this city with intense interest, and while it is not in our province to enter too extensively into detail, yet we purpose to keep our readers apprised of the progress of the battle; for it is a battle, in every sense of the word,—it is a battle between right and wrong, between educational progress and enlightenment and educational incompetence. The result will be either to free the schools and their hundreds of thousands of pupils from the deadening influence and control of a political ring, or it will fasten that influence and control on them more surely than ever. If the thinking citizens of the metropolis can be brought to appreciate the real nature of the alternative, the result cannot be for a moment doubtful. From all parts of the country, protests should be sent to the authorities in New York in order that they may be made to see that the country's intelligence and the country's conscience are fully aroused in this matter.

IN THE CURRENT ISSUE of the *Forum*, Ex-President Andrew D. White of Cornell has a suggestive article on 'The Next American University.' It is nothing less than the skeleton of a plan for a national examining university, with sufficient funds to bestow fellowships, scholarships, and travelling bachelorships. Its strength lies in its co-operation with existing institutions of collegiate grade. Its weakness, as a plan, is the immense amount of money required to put it in operation. It would furthermore be difficult to select a suitable chancellor, or, at all events, a succession of suitable chancellors, for such an institution, without incurring the hostility or jealousy of some sectarian body or some educational faction. The ordinary college has an historic policy of its own, and the president is to execute and develop it. In such an institution as Mr. White has in mind, the chancellor would be university, policy, and every thing else, so long as he held office. But if the money is forthcoming, let the plan be tried, and let Mr. White be the first chancellor.

THE WASHINGTON SCIENTIFIC SOCIETIES have suspended their meetings for the season after seven months of remarkably successful work. Every session has been well attended, and there have been more papers than there has been time to listen to. Many of these have reported important progress in original investigation, and many others have described work which, although not pushing out into new fields, has perfected and filled up gaps in the work in old ones. The three leading societies—the Philosophical, Biological, and Anthropological—have, by their co-operation, maintained the annual course of Saturday afternoon free scientific lectures. These have all been of a high order, and have been listened to by intelligent audiences that have filled to its utmost capacity the auditorium of the National Museum. *Science* has devoted more attention, and given up more of its space, than usual, during the past few months, to papers presented at the meetings of these Washington scientific societies; and some of our readers may think that we have given them un-

due prominence, especially as we have not published the proceedings of scientific societies in other cities. If there are any such, we would remind them that the scientific societies of Washington are unique; they are composed almost entirely of gentlemen employed in the scientific bureaus of the government, many of them engaged in making original researches that could not be carried on by private enterprise because of their great cost. A large proportion of the papers read before the Washington societies are actual reports of progress or of the results of these investigations, and thus anticipate the official reports by months, and often by years.

ONE OF THE MOST INTERESTING features of the very creditable exhibition of the industrial work of the past year in the public schools of Washington, given last week, was what were termed the 'spontaneous' products of some of the pupils; that is, work done outside of the schools. Some of this was suggested by the teachers, and some was not, but in each case it was voluntarily performed by the pupil. One boy, ten years old, exhibited the head of an Indian, a dog, and a horse, modelled in clay, which showed much latent artistic taste and skill. Another boy, twelve years old, made a vase of clay adorned with blooming roses which he had colored. A third boy, ten years old, had modelled a cluster of roses. One of the boys in a higher grade had made an electric bell, a wire from which stretched around the hall, and was operated by means of a button in a distant part of the room. Two other boys, still in the grammar-school, had made two telephones, which were placed at opposite ends of the hall, and which worked perfectly. This 'spontaneous' work, the teachers say, is indirectly the result of the manual training recently introduced into the public schools.

VERY GREAT IMPROVEMENTS have been made in the National Museum at Washington during the last six months. Professor Goode conceives that the object of that institution should be to teach facts in regard to the resources, arts, and industries of the United States, and to a more limited extent of the world, instead of to make exhibitions to please the eye or excite the wonder of the visitor. There are many things in the National Museum that never ought to have been placed there. For instance: there is a cat upon a fence, with the query why she doesn't go over. The reason is shown in the companion object, which shows a large turtle on the tail of the cat. Probably the worst object in the museum is a deer covered with nails. It was probably once owned by some tradesman who dealt in nails, and who covered it with samples of his wares, and placed it outside his door to attract customers. How it came in the National Museum we do not know; but we do know that it ought not to remain there, and shall be surprised if Professor Goode does not soon banish it to the lumber-heap.

THE WEATHER-PREDICTIONS.

THE meteorological work of the Signal Office began in 1870, when an appropriation of \$15,000 was made for it. When the weather-predictions were first published, they were looked upon with curiosity and wonder by the people, who were surprised rather that they were verified at all than that they sometimes failed. After eighteen years the weather-predictions have become a part of the every-day necessities of the people of this country. They consult them almost hourly, and by them shape their plans affecting their health, their pleasure, and their business. Instead of

\$15,000 a year, the meteorological work of the Signal Office now costs \$900,000, and has cost as much as \$1,000,000.

In eighteen years, and with such liberal expenditures of money, this service ought to have increased, not only in the extent of its operations, as it has done enormously, but in the character of its work. With so much broader field of operations, the advancement that has been made in meteorological science, and the experience gained in eighteen years, the weather-predictions now ought to be made with much more confidence than formerly, and a larger percentage of them ought to be verified. But such improvement has not been made; at least, not to the extent that it ought to have been. The public have found this out, and, being more critical than formerly, as they have a right to be, complain when they suffer in health, comfort, or pocket through a failure of the predictions to be verified. Why is it, that, while the percentage of successful indications in 1883 was 89.1, it was in 1887 only 73.9, or, allowing for the fact that predictions are now made thirty-two hours in advance, instead of twenty-four as formerly, only 80.9?

Some, but not all, of the reasons are given in the last annual report of the chief signal officer. The indications are not now made by gentlemen who have had sufficient experience. General Greely says, "Within the past three or four years the relief of the old officers detailed from the line of the army has been forced upon the chief signal officer by legislative action. In consequence, it followed that the young officers of the signal corps, who have only within the past year or two received any extended instruction in meteorology, have been assigned to this important duty [of preparing the indications]. Within the past year three officers have necessarily been assigned to indications work who never before have performed duty of this character. It consequently follows, that, through restrictive legislation, the chief signal officer finds himself compelled to permit the new officers to serve their apprenticeship in predicting, at the expense of the whole country. It has occurred, as might be expected, that the novices in the work at times made errors that subjected the service to criticism, which, well merited in such cases, cannot be considered valid criticism of the methods followed by the service. It follows, too, that not every officer who satisfactorily performs practice indications work is well qualified for actual work. Not only is the predicting-officer weighed down with a strong sense of responsibility in the performance of this difficult and vastly important work, but he is also required to decide with as great degree of accuracy instantly, as though he had ample time at his disposal. The officer, as a rule, predicts for forty different districts, for which three elements — temperature, weather, and wind — must be determined. As the time for these predictions is strictly limited, it necessarily follows that each State or district receives less than sixty seconds' consideration at the hands of the indications officer, and each element is predicted with not over twenty seconds' consideration. Officers who have done creditable practice-work have not infrequently failed when called upon to decide instantly and officially future weather-conditions for the whole country."

And again: "The detailed records of this office show how necessary is experience for success in predicting; and it has always followed, that, after a considerable lapse of time in which no work has been done, an indications officer recommences work less successfully and with a very reduced percentage. How essential practice is to success is shown by the comparison of the work years since, when officers continued steadily on this work, with the results of late years, when changes have been frequent and the course of work necessarily broken."

Lack of proper organization of the signal corps is another cause of its failure to meet public expectation. As General Greely says, "Officers and men of the high order of ability and intelligence required by this duty cannot be expected to devote the best years of their life to a service which offers no reward in way of increased rank or pay even for the most valuable work. Poor pay and no possible advance in rank must produce unsatisfactory results. . . . Only two of the original detail remain with the corps, many having voluntarily quitted duty which promised no advancement, and some have gained promotion and reputation in other corps. . . . It is only by long study and great experience that indications officers, who perform the vital work of this service, can expect to be at all

efficient in their important duties." Important as this branch of the service is, touching as it does so many vital interests of the people, Congress has always neglected to give it proper attention. In more than eighteen years no separate and distinct law affecting the Signal Service has been enacted. The only legislation regarding the corps has been in the shape of 'riders' upon appropriation bills, which, as a rule, have not had proper consideration. The law of 1866, re-organizing the army, directed the detail of six officers and one hundred men from the engineer corps. No engineer officer has ever been detailed to the signal corps. The same law provided that no officer or man should be detailed without examination and approval by a military board. This mandate has also been ignored. Under a perversion of a law of 1878, civilians have been enlisted as privates, promoted the same day to be sergeants, commissioned the next day to be second-lieutenants, and sent into the signal corps without examination of any kind, and without having served a day in the corps, to take the places of experienced men who have thus been crowded out and sent back to their regiments.

Although the Signal Service is one dealing entirely with physics, until General Greely, then a subaltern, urged the importance of it, no question bearing on the natural sciences was ever put to any sergeant examined for promotion. The result is that some of the second-lieutenants of the signal corps are officers whose mental qualifications and natural ambitions will insure their remaining in the service even under a rigid examination; while there are two other classes, one of which consists of young men, whose natural aptitudes tend rather in the direction of the line of the army than with a strictly scientific corps. The mental abilities, general education, or moral standing of the third class is such that it cannot be reasonably expected that they would ever serve with marked credit either in the line of the army or in the signal corps. General Greely has said officially that the records of the office show that the senior officer in the signal corps, next to the chief signal officer, has never been able to attain such a knowledge of the methods and work of the Signal Service as has always been exacted from every sergeant in the corps; this despite the fact that the officer in question received the most careful instruction, covering a period of nearly two years, and was thrice examined on questions which were substantially the same.

Nor has the whole story yet been told. The present secretary of war has never shown any interest in the Signal Office, and has seconded none of the efforts of the chief signal officer to improve the service. A bill, prepared by General Greely, to re-organize the corps and correct the abuses (for they are nothing less) described above, was not approved by Secretary Endicott, who seems only anxious to get rid of the bureau, and not to care how greatly demoralized it may be. The Senate in the last Congress passed a bill to transfer the Signal Office to a civil department; but it failed in the House, which already this session has incorporated in the bill creating a Department of Agriculture, which it has passed, a provision transferring this bureau to that branch of the government. In both cases it is provided that the officers now on duty in the Signal Office, with all their good qualities and defects, shall go with the service without prejudice to their commissions: in other words, although it is proposed to make the bureau a civil one, yet the officers are still given an immovable tenure of office, without discrimination being made between the worthy and the incompetent, — a perpetuation for an indefinite time of the present extravagant, inefficient, and demoralized organization of the office. Against this, General Greely protests, and asks Congress to re-organize the service whether the transfer is made or not, cut down the expense of it \$100,000 or \$125,000 a year, and give him a chance to make it perform its work as it should do, and as Congress has a right to expect it to. But his bill and communication receive no attention from the committee of either House. Mr. Hatch, chairman of the House committee that reported the bill which has passed that body this session, has never been to the Signal Office to learn any thing about the service, or communicated with the chief signal officer as to the needs of the service. He simply attached the provision making the transfer to the Agricultural Department bill without knowing what its effect would be. The first result of the enactment of the bill into a law will be the necessity of appropriat-

ing \$65,000 additional a year to man the military telegraphs, which will then be left without an operator, instead of saving \$125,000.

Is it any wonder that the weather-predictions are not always verified? General Greely, confident that the Signal Office will soon be transferred to a civil department, in loyalty to the government, began, at the opening of the present fiscal year, some preparation for it, especially by training civilians in weather-predictions, detailing one on each alternate month. Professor Abbe was performing this duty in March; and although years ago, when he had long-continued practice, he was remarkably successful, he failed to foretell the great blizzard, of which something certainly ought to have been known in advance. Similar conspicuous failures this year may be explained in the same way.

A word ought to be said about the cold-wave predictions. These are an extension of the service within the past few years, and, as a knowledge in advance of sudden great changes of temperature is of great importance on account of its bearing on the health of the people and the safety of many kinds of property, these reports, a very large percentage of which have been verified, have become very popular.

THE POLYTECHNIC INSTITUTE.¹

EVERY middle-aged inhabitant of the British Islands must recall more than one occasion when the mind of our country has been strongly stirred on the question of national defence. The adverse evidence of an expert, a rousing article in a newspaper, has often awakened general anxiety of more or less continuance, and been followed by more or less adequate results. But it is far more difficult to awaken any widespread concern on behalf of those great abiding national interests which it is our charge and heritage to defend. And yet there are signs of no uncertainty which must to all thoughtful and instructed minds, from many directions, suggest the question whether that industrial leadership which has hitherto made our small and crowded country the world's workshop, and almost the world's mart, is not slipping from us. This is a question not of more or less wealth or luxury, but of very livelihood to the masses of the people under the special conditions of our national existence. If work ceases to come to a workshop, there is nothing for it but prompt dispersal of the workmen. All authorities seem agreed that the population of five or six millions inhabiting England and Wales in the time of Queen Elizabeth represents pretty nearly what their areas can sustain as agricultural, self-supporting countries. But the population of England and Wales alone was shown by the census of 1881 to have reached nearly twenty-six millions; so that seven years ago there was in the southern half of Great Britain an excess of twenty millions above what the country could reasonably support, except as a community of artificers and traders, and general carriers, by import and export, of the world's merchandise. It needs only a glance into past history to see that this, while an enviable position for a nation while prosperity lasts, is practical extinction when the channels of commerce are turned, or lost advantages have transferred production to new centres. Macaulay's fancy picture of the New-Zealander sketching the ruins of St. Paul's from the broken arches of London Bridge seems of very little concern to the present citizen, whose ears are deafened with the ceaseless roar and traffic of the streets. And yet precisely that doom of silence and decay has befallen many a proud mother-city of which now "even the ruins have perished." It would far exceed present limits to show in detail how many articles of our own immemorial production we ourselves now largely import, because the foreign workman produces them better, or produces them at less cost. The evidence will be fresh in the recollection of the readers of this journal. Neither can they fail to recall with what persistence we have pointed out the remedy. There is but one real remedy, — the better training of the workman, and — if we may be allowed to say it — of his employer too. Every one who, without prejudice, has opportunity to watch a fair specimen of the British workman at his work must admit that the raw material is as good as ever it was; that, in the quantity and quality of the work he can turn out in a given time, few of any nationality can equal, and none surpass him. But in the training he receives, and in the opportunities of his receiving it, there is much left to be

desired. And meantime there is not only the grave fear, but in many branches of industry the accomplished fact, that other nations may and do outstrip us in the race.

Perhaps there is some belated merit in seeing that now; but all honor to those who, with heart and means to labor towards the better training of our artisans, devoted themselves to the endeavor when the need for it was less comparatively obvious. Honor especially to one man, Mr. Quintin Hogg, who, close upon a quarter of a century ago, at an age when most young men are concentrating their best energies on cricket, or foot-ball, or lawn-tennis (all good things in their way), made it his life's task to raise the skilled workman of London, and furnish him more fully for his labor, for his own sake and for ours. Probably most of our readers know how that small enterprise has become a great one indeed, with the old Polytechnic for its present home and centre, and with a fuller variety of classes and branches, and with a greater comprehensiveness of scheme, than we can now attempt to describe. But all has hitherto rested on the shoulders, and been sustained by the purse, of Mr. Hogg himself, who, during the past six years, has spent, speaking broadly, some £100,000 in establishing and sustaining these admirable schools. But the time has now come when so great a burden, for the work's sake as well as for his own, should no longer depend upon the means and life of a single man; and there is now an opportunity of securing for the institute something like an adequate endowment. The charity commissioners have offered to endow it with £2,500 per annum on condition that the public find £35,000 as a supplementary fund. £18,000 have already been promised by the personal friends of the founder; but £17,000 still remain to be raised, — a large sum, no doubt, but a small one compared to our still unrivalled resources, and the national value of the institute, not only for its own immediate results, but as a model for similar efforts in all the great centres of our industry. Those who believe in science — that is, in faithfully accurate and exact knowledge — as the only sure basis for any national prosperity that is to bear the stress of the fierce competition of our times, are earnestly invited to make themselves acquainted with the work of the institute, and to contribute to its funds. Eighty-one thousand members and students have joined since it was moved to the Polytechnic, 309 Regent Street, in 1882. All donations or subscriptions will be thankfully received there, or by Mr. Quintin Hogg, 3 Cavendish Square, W.

SCIENTIFIC NEWS IN WASHINGTON.

Tricks of Indian Jugglery. — The May Fogs on the Atlantic.

Indian Jugglery.

THE feature of the evening at one of the late meetings of the Anthropological Society was a paper by Col. Garrick Mallory on 'Algonkin Glyphs on Bark and Stone.' The paper also dealt briefly with some related subjects, and will form a part of the annual report of the Bureau of Ethnology. The following is a brief chapter on 'Indian Jugglery,' extracted from this paper: —

"Paul Beaulieu, an Ojibwa of mixed blood, present interpreter at White Earth Agency, gave me his experience with a Jossakeed, at Leech Lake, about the year 1858. The reports of wonderful performances reached the agency, and, as Beaulieu had no faith in the jugglers, he offered to wager one hundred dollars, a large sum, then and there, against goods of equal value, that the juggler could not perform satisfactorily one of the tricks of his repertoire to be selected by him (Beaulieu) in the presence of himself and a committee consisting of his friends.

"The wager was accepted, with the result to be described.

"A medicine lodge was made. Four strong poles were planted deep in the ground, rising to an elevation of at least ten or twelve feet; one of them having the branches remaining and rising a little beyond its fellows, this being the indication of a Jossakeed as distinguished from a Medé lodge. The interior diameter was less than four feet. The frame, which was inclined to the centre, was then filled in with intertwined twigs, and covered with blankets and birch-bark from the ground to the top, leaving an orifice of about a foot in diameter open for the ingress and egress of spirits and of the objects to be mentioned, but not large enough for the passage of a man's body.

¹ From *Nature* of May 24, 1888.

"At one side of the bottom wrapping a flap was left for the entrance of the Jossakeed or Shaman.

"A committee of twelve was selected to see that no communication was possible between the Jossakeed and confederates. These twelve men were reliable people, one of them being the Episcopal clergyman of the reservation. The spectators were several hundreds in number, but stood off, not being allowed to approach.

"The Jossakeed then removed his clothing, until nothing remained upon his person but the breech-cloth. Beaulieu then took a rope (of his own selection for the purpose), and first tied and knotted one end about the ankles; the knees were then securely tied together; next the wrists; after which the arms were passed over the knees, and a billet of wood passed under the knees, thus securing and keeping the arms down motionless. The rope was then passed around the neck again and again, each time tied and knotted, so as to bring the face down upon the knees.

"A flat river-stone of black color—which was the Jossakeed Manedo or amulet—was left lying upon his thighs. The Jossakeed was then carried to the lodge, placed inside upon a mat on the ground, and the flap covering restored so as completely to hide him from view.

"Immediately loud thumping noises were heard, and the framework began to sway from side to side with great violence; whereupon the clergyman remarked that this was the work of the Evil One, and it was no place for him: so he left, and did not see the end. After a few minutes of violent movements and swaying of the lodge, accompanied by loud inarticulate noises, the motions gradually ceased, when the voice of the juggler was heard telling Beaulieu to go to the house of a friend near by, and get the rope. Now, Beaulieu, suspecting some joke was to be played upon him, directed the committee to be very careful not to permit any one to approach while he went for the rope, which he found at the place indicated, still tied exactly as he had placed it about the neck and extremities of the Jossakeed. He immediately returned, laid it down before the spectators, and requested of the Jossakeed to be allowed to look at him, which was granted, but with the understanding that Beaulieu was not to touch him.

"When the covering was pulled aside, the Jossakeed sat within the lodge, contentedly smoking his pipe, with no other object in sight than the black stone Manedo.

"Beaulieu paid his wager of one hundred dollars. An exhibition of similar pretended powers, also for a wager, was announced a short time later at Yellow-Medicine, Minn., to be given in the presence of a number of army people; but at the threat of the grand medicine-man of Leech Lake bands, who probably objected to interference with his lucrative monopoly, the event did not take place, and bets were declared off.

"At Odanah, on the Bad River Reservation, and at Bayfield, both in Wisconsin, I obtained some variants of the above performance as seen at different times and places and by several witnesses. For instance: the Shaman at one time was tied up much as before mentioned, but with all of his clothes on; a fish-net, however, being tied above his clothes, enveloping the whole person; and horse-bells were attached to his body, so as to indicate any motion. When examined afterwards, the clothing had been entirely stripped from his person, the nets and ropes and bells placed in a separate pile in the lodge, and the clothing itself was found by direction under a designated tree a mile off; the Indians of the committee, one of whom was my informant, running from the lodge at their highest speed, to the tree, and there finding the clothing, and stating the impossibility of its being transported by any human agency in advance of their arrival. In another case, occurring at night, two lodges were built about twenty feet apart. About a hundred Indians surrounded the space occupied by the two lodges with lighted torches giving the brightness of day, and a line of bonfires was built and kept in flame over the space intervening between the two lodges. The levitation in this case was by the bound Shaman in one lodge being found unbound in the other.

"It should be noted that these stories relate to a time some forty or fifty years ago, before the tricks similar to those of the Davenport brothers had become known in the civilized portions of the United States. It is a still more important fact that the French missionaries in Canada, and the early settlers of New England, de-

scribe substantially the same performances when they met the Indians, all of whom belonged to the Algonkin stock. So remarkable and frequent were these performances of jugglery, that the French, in 1613, called the whole body of Indians on the Ottawa River, whom they met at a very early period, 'the sorcerers.' They were the tribes afterwards called Nipissing, and were the typical Algonkins. No suspicion of jugglery in the sense of deception appears to have been entertained by any of the earliest French and English writers. The severe Puritan and the ardent Catholic both considered that the exhibitions were real, and the work of the Devil. It is also worth mentioning that one of the derivations of the name 'Mic-mac' is connected with the word meaning 'sorcerer;' so that the known practices of this character having an important effect upon the life of the people extended from the Great Lakes to the extreme east of the continent. It was obvious to me, in cross-examining the various old men, that the performances of jugglery were in each case an exhibition of the pretended miraculous power of an individual, whereby he obtained a reputation above his rivals, and derived subsistence and authority, by the selling of charms and superhuman information. The charms or fetiches, which still are sold by a few who are yet believed in, are of three kinds,—to bring death or disease on an enemy, to lure an enemy into an ambush, and to create sexual love."

The Unusual Prevalence of Fog during May.

The belt of frequent fogs during the past month, as shown graphically on the Pilot Chart for June, extended well up into the Gulf of St. Lawrence, and across the Atlantic from shore to shore. While the amount encountered off the Grand Banks and the coast to the westward is but little in excess of the normal for May, yet such great frequency of dense fog-banks east of the 40th meridian is very unusual. It may be attributed almost entirely to the unusual prevalence in that quarter of the ocean of southerly winds, which lasted for fourteen days during the first two decades of the month. These winds bring the warm, moist atmosphere from lower latitudes far to the northward, and into contact with the colder air of more northerly regions, this contact resulting in the precipitation of the moisture in the form of fog. Adding to this the fact that most of the depressions noted during the month passed well north of the 50th parallel after reaching the 40th meridian, thus lessening the clearing effect of their north-westerly winds, it will be seen very readily that the conditions were peculiarly favorable to the development of fog along the transatlantic routes.

Early in the month, small patches of fog were reported, also, to the westward of Bermuda, about the 70th meridian, accompanying north-westerly winds blowing toward a slight depression in about 32° north and 63° west, on the 2d and 3d. The dense fog along the coast north of Hatteras on the 6th, which led to the collision between the British steamship 'Benison' and the American steamship 'Eureka,' by which the latter was sunk fifty-six miles east-south-east from Cape Henry, was due to the prevalence of southerly winds in the western quadrants of an area of high barometer about the Bermudas, which, blowing up the coast from over the Gulf Stream, came into contact with the cold water of the inshore current, with the usual result.

MENTAL SCIENCE.

Illustration of the Play-Instinct.

AN article entitled 'The Story of a Sand-Pile' would not at once suggest any thing of interest to the psychologist; nevertheless the story as told by Prof. G. Stanley Hall (*Scribner's Magazine*, June, 1888) is full of suggestiveness to one approaching the study of mind with an appreciation of all the various aspects that mental phenomena assume in the world of nature. The story of the 'sand-pile' tells of two boys who had the advantage of playing with a load of sand placed for that purpose in the back-yard. This at once became the centre of all their interests, and by a gradual growth assumed the appearance of a miniature community. Roads were laid out, coal placed in the ground to be afterward discovered, and a sort of cave-dwelling erected. The next summer the evolution went on, fortunately undisturbed by parental suggestions.

The house became a board with another slanted against it; then it was two bricks and a board on top. A bit of wood suggested to one of the boys a horse, and that became a horse; others being made like it, at first very rude, and afterwards with all the refinements that a scroll-saw could add. Cattle were made and added to the houses, there being a remarkable conservatism in adhering to an original model, though the boys were able to do better work. Before many summers there was a community modelled quite closely after the village in which they lived: crops were raised, stacked, and sold, as in town. Furthermore, the men and women of the 'sand-pile' were named Bill Murphy, Charles Stoughton, Peter Dana, etc.,— names of real men in the village; and the personality of the real individual, that of the puppet and of the boy who owned it,—for other boys had been admitted by this time,—were strangely confused. If the real Farmer Murphy had done any thing disreputable, the boys threatened to suspend the boy who owned the puppet Farmer Murphy from the 'sand-pile.' The boys take their men along in their pockets on a pleasure-trip, send them in letters to distant friends to have them returned, and be said to have seen distant places. "The best man has travelled most, keeps his farm in the best order, has most joints in his body, keeps dressed in the best coat of paint, and represents the best farmer in town, and is represented by the best boy."

The industrial evolution of this agricultural community strikingly reminds one of the real evolution in the history of the race. The plough, the wagon, and so on, can be seen in the several stages paralleled by the relics in museums. The political organization reflects that of the town, as well as that of primitive communities. Money was first made of a kind of card-board, but, owing to the possibility of counterfeiting, felt gouged out by an instrument was substituted. At the beginning of the season ninety dollars and fifty half-dollars were given to each boy. So real were these coins to them, that silver is said to have been refused for the felt, the varying intensity of the play-spirit being recorded in the silver value of the felt money. When a grocer—the youngest boy—failed, he was at first aided, and then meetings held to consider the case. "One proposition was a general *pro rata* subscription; another was a communistic redistribution of the money of the community. These schemes were successfully opposed, however, and it was at last agreed to inflate their first currency by issuing enough money to give each boy an additional sum of ten dollars. While this matter was under discussion, and redistribution was expected by some, prices were affected, and a few sales were made at prices so high as to cause embarrassment later."

As the boys grow older, the institution begins to lose its reality, and the circle of their interests changes. Moreover, "the golden age of this ideal little republic has already passed," and "a period of over-refinement and enervating luxury" is likely to end its career. Self-consciousness and the desire for approval replaced natural interest. The parents regard the educational advantages of this 'sand-pile' as outweighing the eight months of school-work: it cultivates co-operation, justice, and reflection; leads to industrial skill, saves idleness, and prevents bad habits. Its educational import is thus characterized by Professor Hall: "Had the elements of all the subjects involved in the 'sand-pile'—industrial, administrative, moral, geographical, mathematical, etc.—been taught separately and as mere school-exercises, the result would have been worry, waste, and chaos. Here is perfect mental sanity and unity, but with more variety than in the most heterogeneous and soul-disintegrating school-curriculum. The unity of all the diverse interests and activities of the 'sand-pile' is, as it always is, ideal."

HEAD-GROWTH IN CAMBRIDGE STUDENTS.—Mr. Francis Galton makes an interesting report on measurements of the heads of Cambridge (England) students, which we owe to Professor Venna (*Nature*, May 3). What is called a 'head-product' may be fairly regarded as representing average brain-volumes. It is obtained by multiplying the maximum length of the head by its maximum breadth and its maximum height above a certain plane. This result represents the contents of a rectangular box that would just fit over the head. This is only rudely proportional to the brain-mass in individuals, but would be closely proportional to it in the average of many cases. The result of the measure-

ments, which have been taken within the last three years, is as follows:—

Ages.	Class A. 'High-Honor' Men.	Number of Measurements.	Class B. The Remaining 'Honor' Men.	Number of Measurements.	Class C. 'Poll' Men.	Number of Observations.
19	241.9	17	237.1	70	229.1	52
20	244.2	54	237.9	149	235.1	102
21	241.0	52	236.4	117	240.2	79
22	248.1	50	241.7	73	240.0	66
23	244.6	27	239.0	33	235.0	23
24	245.8	25	251.2	14	244.4	13
25	248.9	33	239.1	20	243.5	26
and upwards						
		258		476		361

In spite of many irregularities, the following conclusions may be fairly deduced from these figures: (1) that while, in the population at large, brain-growth ceases after the age of nineteen, this is not true of university students; (2) that men who obtain high honors have considerably larger brains at nineteen years than those who do not; (3) that this predominance is reduced to about half its extent at the age of twenty-five, the brain of the 'high-honor' man increasing by about three per cent, that of the 'poll' man by about six per cent, in this period; (4) that the 'high-honor' men are presumably a class both more precocious and more gifted than the others.

AN INTERESTING MEMORY-TEST.—Mr. H. H. Ballard publishes in the *Journal of Education* for May 3 the result of a test of the memories and receptive powers of school-children. The sentence, "Your redemption from the distress into which you have fallen is in your own hands, and in no wise depends on forms of government or modes of election," was carefully read to one of ten selected pupils, who repeated it as exactly as possible to the next scholar, and this one to the third, and so on to the tenth. The tenth pupil wrote down what he received from the ninth. In one case the sentence emerged from this process as, "The redemption of your distress is in your own hands;" in another it was, "The invention which has fallen into your hand;" and the sentence had dwindled into this already at the sixth pupil. In another case the sentence was whispered instead of distinctly read, and the process of calling on the imagination when the senses give no clear impression is illustrated in the result, which was, "The attempts into which we have fallen during the government election are very low." In the Pittsfield, Mass., High School the sentence reduced to, "Redemption is in your own hands, and depends upon no formal government nor love." In the senior class of another high school, in which the average age of the pupils was eighteen years, the result was, "Our redemption for our destruction has nothing to do with us." In still another high school it was, "Your distress into which you have fallen is by no means the fault of government." A set of eight-year old pupils reduced it to, "The redemption that lies in your hand is done;" and the first class of the high school in the same town made it, "Your redemption into which you have fallen is your own fault." In one school the experiment was modified: two pupils from each of five grades were selected, and the sentence clearly read aloud to them all. After a minute's interval, each of the ten wrote down what he could of the sentence. The sentences written by one pupil of the highest, one of the middle, and one of the lowest grades were these: "Your redemption from the distress into which you have fallen lies in your own hands, and in no wise depends on the government or manner of election;" "Your redemption from the distress into which you have fallen is in your own hands, and depends in no wise upon the forms of government or the

modes of election ;" "Your redemption and distress in which you have fallen depends on yourself, and in no wise on the government or its mode of election." Although not one of the ten got it perfectly accurately, yet many were very near it; and they all show how much more the wear and tear on the sentence is in passing through ten mouths than through one. By the other process one accumulates the combined inaccuracies of all, and one pupil with a very poor receptive organ in the middle of the ten prevents the circulation of a good repetition after him. After this the sentence was passed through the ten pupils arranged in order of grade, and issued as, "Your redemption from the distress into which you have fallen depends entirely upon yourself, and by no means upon the forms of government or helps from education." The sentence here selected is quite a difficult one, but an easier one from Emerson was hardly more successful. The sentence was, "All things are double, one against another,—tit for tat, an eye for an eye, a tooth for a tooth, blood for blood, measure for measure, love for love,"—and the result, "All things are good for one another." Although the test, as thus applied, is too complex to allow valid inferences to be drawn from it, it at any rate shows how difficult it is to repeat accurately what has been heard, as well as how little confidence is to be placed in the declarations of persons reporting the very words of a conversation held weeks or months before; it illustrates, too, in a simple form, the process by which a simple tale becomes an elaborately embellished narrative by passing through several hands; and perhaps it indicates that the powers of careful attention and retention need more systematic training than is devoted to them in the ordinary school-work.

HEALTH MATTERS.

SEA-SICKNESS.—Dr. W. H. Gardner, U.S.A., in a letter to the *New York Medical Record*, reports having treated many cases of sea-sickness with oxalate of cerium, in ten, fifteen, or twenty grain doses, every two or three hours. He believes that seventy-five per cent of all cases that occur will be cured by this remedy. As many of our readers are about to leave the United States for a summer's jaunt in Europe, an admirable opportunity presents itself for testing Dr. Gardner's remedy. As oxalate of cerium is a recognized drug to be administered in cases of nausea and vomiting, we see no reason why it should not be efficacious in sea-sickness.

FUNCTION OF THE BILE.—Among the many mooted questions in physiology is the function of the bile, and every new fact bearing upon this important subject is of great value. Dr. Dastre, as reported in *Le Progrès Médical*, recently communicated his observations to the Société de Biologie of Paris. He said that he had previously proven that the presence of bile in the stomach during different periods of digestion did not take from the gastric juice its digestive power: consequently it could not be the cause of vomiting or of severe gastric troubles. At the present time, owing to the success of two operations for cholecysto-intestinal fistula, he thought himself in a position to conclude that the bile contributed, as well as the pancreatic juice, to the digestion of the fats,—an opinion which is counter to that expressed by Claude Bernard. In fact, the two animals being in good condition four months after the establishment of the fistula, they had been given a meal of fat and milk, and then slaughtered during full digestion. The examination showed with absolute clearness that the lacteals were transparent between the stomach and fistula, and, on the contrary, entirely white and milky below the fistula; that is to say, where the bile had been able to get: consequently, if observation on the rabbit shows us that the bile alone is unable to emulsify the fats, the preceding experience shows us that the pancreatic juice alone is also powerless. They must be mingled, in order to act well. In other words, bile, as well as the pancreatic juice, takes part in the digestion of fats.

A NEW HYPNOTIC.—In the *New York Medical Record*, Dr. E. C. Wendt describes sulfonal, a new hypnotic. Chemically this substance enjoys the euphonious designation of 'diethylsulfondimethylmethan.' It occurs in the form of large, flat, colorless crystals, which are tasteless, and devoid of smell. Sulfonal is soluble

in eighteen to twenty parts of boiling water. In tepid water the solubility is only about one to one hundred. The crystals dissolve more readily in alcohol and alcohol mixed with ether. Acids and alkalies do not affect the composition of the body, which appears to possess considerable chemical stability. The crystals melt at a temperature of 275° to 260° F. According to Professor Kast of Freiburg, sulfonal is an hypnotic pure and simple. It does not compel sleep through a paralytic effect on the nerve-centres, nor through a profound impression produced upon the vascular system. From numerous experiments on animals, and many clinical observations on man, the action of this new remedy would appear to consist merely in the intensification of those factors that lead to natural sleep in the physiological sense, or in supplying the periodical desire for sleep in those cases where it is wanting. It is for this reason, probably, that the range of applicability of sulfonal is a more limited one than that of some other drugs employed as hypnotics. But sulfonal has none of the disadvantages inherent in the deadly narcotics, and it is much more reliable than any of the bromides. This new body does not disturb digestion, it is not constipating, it has no unpleasant after-effects, it is perfectly harmless, it does not invite the formation of 'a habit,' and, finally, it does not appear to lose its efficacy even when employed for a long period.

SMOKERS' VERTIGO.—Dr. Decaisne is reported in the *New York Medical Record* as having recently investigated a number of cases of vertigo in smokers. Out of sixty-three patients, forty-nine were between fifty and sixty-six years of age. More than half of them suffered, in addition, from digestive troubles, with constipation alternating with diarrhœa, insomnia, palpitations, dyspnœa, and diuresis. In a third of the number there was marked intermittence of the pulse, and granular pharyngitis, while others suffered from aphthæ, amblyopia, etc. Thirty-seven were persons who smoked habitually on an empty stomach; and these suffered from vertigo, principally in the morning. The vertigo generally coincided with suppression of perspiration and diminished excretion of urine. The treatment consisted mainly in regulating or suppressing the cause, but thirty-three out of thirty-seven patients ceased to suffer on merely refraining from smoking on an empty stomach.

A LEPER INVASION OF THE UNITED STATES.—It is reported that many lepers are leaving the Sandwich Islands, as soon as the disease manifests itself, in order to prevent being banished to the island of Molokai. Mr. Putnam, consul-general at Honolulu, believes the number of these emigrants to be considerable, and many if not most of them flee to the United States.

RACE AND INSANITY.—In an article entitled 'Race and Insanity,' published in the *American Journal of Insanity*, Drs. Bannister and Hektoen, physicians of the Illinois Eastern Hospital for the Insane, express the opinion that there is little doubt but that insanity is influenced by race. From the statistics of three institutions in which insane persons are treated they draw the following conclusions: 1. That in the white race the depressive types of mental disease are most frequent in the Germanic and Scandinavian peoples, and least so in the Celts: the reverse of this appears to be the case as to the exalted or maniacal types. 2. That general paralysis is not a disorder to which any race is immune, but one that depends upon causes independent of racial or national peculiarities. 3. That the well-known fact that insanity is much more common amongst the foreign-born than amongst natives in this country, is not to any great extent explainable by the shipment of the defective classes of Europe to America. The 'cranks' and epileptics and other neurotic individuals do not appear to be represented, in due proportion even, amongst the foreigners in our asylums. The cause of the excess of foreign-born insane in this country is, it seems probable, to be looked for mainly in the fact, that, supposing the immigration to include only its proportion of persons below the average of mental strength and flexibility, the change of scene and associations, the difficulties of beginning life among them, disappointments, homesickness, and all the other accidents and trials that befall the new-comers, together contribute to break down mentally a vast number who under other circumstances would have escaped, and largely contribute to the mass of insanity in this country.

ELECTRICAL SCIENCE.

Alternating-Current Electro-Motors.

TWO inventions that will greatly modify and improve the conditions of electrical distribution have been for some years past the subject of much thought and experiment among electricians. They are the secondary battery and the alternating-current electro-motor. To-day there are secondary batteries in use, and there are alternating-current motors, that will run with some degree of success; but improvement is necessary in order that they may be adapted to extensive operations, and it is only a matter of time when these improvements will be made.

The Tesla electric motor, of which a brief description has appeared in this journal, seems the most successful attempt that has been made for the distribution of power by alternating currents. The difficulties in the way of such a motor are these: it must start with the maximum turning effort; when it attains its proper speed, it must regulate itself for varying loads; and it must be made to work under constantly changing load; and all these requirements are difficult to fulfil in the same machine. In one form of motor Mr. Tesla obtains synchronism between the revolutions of the armature and the reversals of the feeding dynamo; that is, it regulates itself. This form has little or no turning effort at the start. In another type a considerable turning effort is obtained, but there is no regulation. By combining the two characteristics, a motor is produced that will start, and when it arrives at its proper speed will regulate, itself. This seems the most plausible plan that has been yet suggested for the purpose. It will be remembered that the motor presents the peculiarity of having no connection between the armature-coils and the external circuit, currents being induced in the former by the alternations of the field-currents, and so is the simplest mechanical and electrical arrangement possible.

In a paper read before the Institute of Electrical Engineers, Mr. Tesla explained the system, but unfortunately gave no data as to the efficiency, output, etc., of the motors. Such data will probably be forthcoming, for such a promising invention cannot but be given an exhaustive trial; and it is to be hoped, that, when the data does appear, it will be of a kind to at once allow an opinion to be formed on the value of the *principle* as well as of the particular machine tested.

ELECTRICAL WELDING.—Among the various uses to which electricity has been applied, the welding of metals is one of the latest. Two distinct processes are now in use,—that of Prof. Elihu Thomson, and that of M. Bernados. In Thomson's method a very heavy current is sent between the metals to be joined (which are held firmly against one another), heating the junction until it is to a welding heat. The junction is, of course, the point of greatest resistance, and therefore the heat is mainly concentrated there. The currents are obtained from the secondary of an induction-coil supplied with alternating currents: this secondary is of very low resistance, and is secured to the pieces to be welded by massive clamps. It will be seen that this method is especially applicable to the welding of tubes, rods, wires, etc. The process of M. Bernados is very different. In it the heat of the electric arc is used, the junction to be welded being made one of the poles. Current is obtained from accumulators especially built to resist the ill effects of a heavy discharge rate, and the arc is directed to the proper place by a rod of carbon held in the hand in a suitable holder. The method of operation consists in placing the pieces to be welded on a heavy iron slab, which serves the double purpose of supporting and carrying the current to the plate, meeting the edges of the pieces, then putting the scraps of iron (if iron is to be welded) on the junction, and melting the whole together. For welding steel or wrought iron, a mixture of sand and lime is used as a flux; when copper is one of the metals used, borax is employed. Mr. Ryves, who has investigated the process, and has lately read a paper upon it before the Society of Telegraph Engineers and Electricians, states that in nearly every case the metal was badly burnt and spoiled by the excessive heat. M. Bernados has also lately made a number of experiments on the working of various metals and the production of alloys in electrical furnaces. As far as welding goes, it is very probable that the electric arc can be regulated to give the required heat without burning the

metal. Of the two welding processes, that of Professor Thomson is surer and more easily controlled; that of M. Bernados is more widely applicable.

DIFFERENCE OF POTENTIAL BETWEEN METALS IN SOLUTIONS OF DIFFERENT STRENGTHS.—The following table is not without interest as showing the variation in the electro-motive force of a cell, which might occur when the solution changed in strength from evaporation or other causes. It is unfortunate that potassium cyanide was chosen as the electrolyte, instead of some more commonly used substance. One curious result will be noticed: zinc and copper have a potential difference from a carbon electrode which is at first considerable; but, as the strength of the solution increases, the two substances get nearer together in the table. Carbon was invariably used as the positive element. The differences of potential are in volts.

Strength.....	.006	.025	.25	.5	1.	2.	5.16
Zinc.....	.925	1.130	1.350	1.395	1.450	1.520	1.615
Copper.....	.250	.390	1.215	1.270	1.295	1.425	1.535
Brass.	.290	.580	1.130	1.210	1.295	1.400	1.460
Platinoid. ...	.435	.535	.825	.900	.945	1.030	1.185
German silver ...	.360	.500	.860	.920	.910	1.050	1.180
Silver	—	.390	.655	.695	.760	.845	.970
Lead.	.460	.440	.590	.585	.610	.640	.700
Iron.....	.230	.300	.539	.450	.430	.470	.455

EXPANSION GALVANOMETER.—Prof. W. E. Geyer and Mr. W. H. Bristor have invented a new and ingenious galvanometer. In thermostats and in the balance-wheels of chronometers the difference in the rate of expansion of two metals is taken advantage of to cause a movement, which in the one case closes or opens an electric circuit, in the other compensates for the linear expansion of the wheel. Two strips of different metals are usually fastened side by side; and, as one of them expands faster than the other, it causes the system to bend one way or the other. As an electric current causes heating, and as the amount of heating is proportional to the square of the current, some such arrangement as the above might be used for measuring current strength. The disadvantage with the ordinary form would be that the instrument would have to be adjusted for every change of temperature. To avoid this, Messrs. Geyer and Bristor use a broad strip and a wire of german silver fastened together; one end fixed, the other attached to a registering arrangement. The current passes through these strips in series. Now, while for ordinary changes of temperature both the strip and the wire expand alike, yet, when a current is sent through them, the wire, having the smaller section and less radiating surface, heats the faster, and its greater expansion deflects the needle. By a suitable gearing the deflections are made directly proportional to the currents. This instrument can measure both alternating and direct currents. It is simple, and should be unaffected by the presence of magnets.

THE WATER-JET TELEPHONE-TRANSMITTER.—This transmitter has been recently exhibited in England, where it has attracted attention, both by its novelty, and its excellent performance as a long-distance transmitter. The following is an abstract from a lecture recently delivered by Mr. G. W. de Tunzeemann: "The jet-transmitter consists of a small jet of water, acidulated to render it a conductor, falling upon two electrodes, consisting respectively of a platinum wire, and a platinum ring concentric with the wire, and separated from it by a ring of glass or ebonite. The connection between the electrodes is formed by the nappe of the jet; and, when the jet is thrown into vibration by the sound of the voice, the variation of resistance between the electrodes causes it to act as a transmitter of great delicacy. This delicacy is so great that the voice of a person speaking in an ordinary tone at a distance of fifteen or twenty feet from the instrument is reproduced in a distant telephone with the most perfect distinctness."

BOOK - REVIEWS.

Missouri, a Bone of Contention. (American Commonwealths.) By LUCIEN CARR. New York, Houghton, Mifflin, & Co. 16°.

THE history of Missouri, like that of the other Western States, is necessarily lacking in the interest that attaches to that of the older parts of the Union; but it has elements of interest belonging to itself, which the author of this work has skilfully availed himself of. He begins his narrative with the earliest French explorations and settlements in the basin of the Mississippi, and traces the history of the region west of that river, then known as Louisiana, down to the time of its annexation to the United States; and the chapters treating of these subjects, though they rather pass the proper limits of a history of Missouri, are among the best in the book.

From the time of the annexation the narrative is confined to Missouri itself; and the author then shows how the fertile spot which had been contended for by France, Spain, and England, became a new 'bone of contention' to the advocates and opponents of slavery. The struggle began with the application of Missouri for admission into the Union as a slave State; and though the difficulty was then thought to have been settled by the well-known Missouri Compromise, yet this proved to be only the beginning instead of the end of the trouble, which could not be removed except by the complete abolition of slavery. Accordingly, the latter portion of Mr. Carr's work is necessarily occupied almost exclusively with the various phases of the slavery contest and the civil war, so far as these affected Missouri, which they did in a marked degree. In his account of this great struggle we are sorry to find Mr. Carr's sympathies so strongly on the side of the South. He does not defend slavery; indeed, he shows a decided dislike of it. But, like most of the Southerners and of their Northern sympathizers, he fails to comprehend the moral significance of the anti-slavery movement and the moral earnestness of those engaged in it. In describing the scenes and incidents of the war, however, he shows himself a firm friend of the Union; and in his last chapter he relates with evident pleasure the action of Missouri, alone of all the Southern States, in abolishing slavery within her borders. The stirring themes of war and political struggle fill so large a portion of the later chapters of the book, that we do not get from them so full an account of the social condition of the people in the generation just passed as might have been wished. In some of the earlier chapters, however, the life and industry of the people are described more fully; and careful notice is taken of the financial disturbances that occurred at various times, and of the legislation of the State in regard to banks and railroads and the still more important subject of education.

Taken as a whole, the author's choice of topics is excellent; and he has been particularly successful in showing the connection of Missouri's history with that of the neighboring States and of the Union. The style of the work, though somewhat diffuse, like most of the historical writing of the present day, is clear and dignified; and some portions of the story, such as the conquest of New Mexico and the events at the opening of the civil war, are related in a way that is both interesting and impressive. The book will fill a useful place in the series to which it belongs.

Popular Physics. By J. DORMAN STEELE. New York and Chicago, Barnes. 16°.

TO quote from the author's preface, "this work has grown up in the classroom," and all those who have used any of Steele's Fourteen Weeks Series in natural science will know how admirably this series is adapted to use with elementary classes. The author was in the habit of making a memorandum of any explanation which fixed the attention of the learner, and his books were built up on this experimental method. It is not pretended that the treatises are exhaustive, but it is believed that they are such as to interest beginners, and so to place science before them that some at least may be induced to go further.

Shortly before his death, Dr. J. Norman Steele, finding that he was unable longer to perform extra labor, requested Prof. W. LeConte Stevens of the Packer Collegiate Institute, Brooklyn, to revise the text-book in physics, as so many advances had been made since the last edition of the 'Fourteen Weeks in Physics,' published

in 1878. Professor Stevens's revision has been so thorough and extensive, that it has seemed desirable to change the name to 'Steele's Popular Physics,' and it is under this title that the well-known book now makes its appearance. The book is intended for use in high schools, and gives enough in each branch of the subject to make clear to high-school pupils such physical phenomena as they see about them. All those who know the reviser will feel confidence in the thoroughness of his work.

Our Native Ferns and Their Allies. By LUCIEN M. UNDERWOOD, Ph.D. 3d ed. New York, Holt. 12°.

THE third edition of this useful book will be welcomed by all fern-lovers, and we predict for it a ready sale. One hundred and fifty-six species of true ferns are described as native to the territory, — sixteen more than were included in the first edition, printed in 1881; while of the related plants, lycopods, *Equisetæ*, *Isoetæ*, etc., sixty-eight species are given. The descriptive portion of the work is preceded by a carefully prepared account of the structure-habits, haunts, geological history, and the relation of *Pteridophyta* to the other sub-kingdoms of plants. This last is especially treated in the chapter on 'The Fern's Place in Nature,' including brief accounts of the several systems of vegetable classification. Professor Underwood gives greatest prominence to what he terms the 'American System,' which, dividing the *Thallophytes* into three sub-kingdoms, founded entirely on the characters of the reproductive organs, completely destroys the natural groups of algæ, lichens, and fungi, and, in the writer's opinion, is not to be commended. This is, however, quite unessential to the general purpose of the book. Older specific names for many of the species are extant, and we regret that Professor Underwood did not take the opportunity of adopting them. In the next edition he may, perhaps, conclude to do so.

The Fundamental Principles of Chemistry. By ROBERT GALLOWAY. London and New York, Longmans, Green, & Co. 12°. \$1.75.

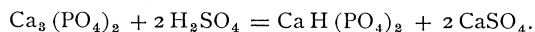
IT would probably be difficult to find a better exemplification of the fact that the critical and creative faculties are not invariably associated in the same individual than appears in several recent attempts, on the part of prominent fault-finders with existing models, to produce something better in the way of elementary text-books of science.

The volume before us emphasizes this point once more, and with force. It is an effort to replace the chemical text-books in use in the schools, and for teaching junior students generally, by a production "more in harmony with the laws of thought." The author has "long held that chemical works intended for beginners are unsuitable as educational works; if these books extend only to a few pages, the arrangement and construction is the same as that adopted in Gmelin's great work of *reference* in the science, which extends to eighteen large volumes: the plan is encyclopedic, — excellent for a book of reference, unsuitable for an educational work. In this system the facts are unclassified; the laws, the highest generalizations, are placed apart from the facts; and no plan for teaching the language of the science, which requires to be taught like any other language, is given beyond a few general observations." Twenty years ago these views were announced, and, if we are to judge from the internal evidence of the book, changes of method during the interval which has elapsed have not commended themselves to the author. The work is ostensibly devoted to the "fundamental principles of chemistry;" but examination reveals the fact, that, of three hundred and fifty-six pages, nearly one-half is given up to the exposition of the subjects of molecular attraction, heat, gravitation, the properties of gases, the elastic force of vapors, density, sublimation, precipitation, adhesion, and capillary attraction, which are regarded as the general principles of physics "suitable for the course of pure chemistry given in the after-part of the work." It is without doubt most desirable that the student of chemistry should possess a knowledge of the principles of physics, and, were this part of the work endowed with any particular novelty or merit, the misleading character of the title might be passed by; but the sad fact is, that in the preparatory half of the book we fail to find any thing but the old tale of multitudinous facts and

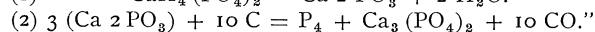
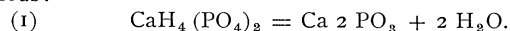
principles, presented in a manner far inferior to the best modern examples, and insufferably dull. Even in the matter of information it is not up with the times. We are told that "the two prevailing opinions with regard to the nature of heat are the *theory of emission* and the *theory of undulation*; the latter of which, it is added, is now generally accepted, but so overburdened with inherited terms of indefinite meaning as to occasion much confusion of mind, and to necessitate the admission to the student seeking exactness, that all who study the subject are impressed with their vagueness and unsatisfactoriness. After this we could hardly be surprised to note that the atomic hypothesis is an invention of the "late Dr. Dalton," who derived some suggestion of it from the ancient philosophers, by which term, we presume, reference is made to the late Lucretius, Leukippos, and others.

The latter half of the book, however, is so much worse, from an educational point of view, that we are inclined, on the whole, to admire the astuteness which led to a change of base and the filling-in of the former half with less unwieldy material, though the proceeding is somewhat suggestive of the tricks of the medical practitioner of tradition, who, failing in the diagnosis and treatment of existing complaints, possessed the art and acuteness to get his patient into fits, in the management of which he considered himself to be an adept. As in most books on elementary chemistry, we find descriptive text, directions for experiment, and problems to be solved; but the scientific method — the careful and logical adjustment of experimental conditions to the end of securing conclusions as definite as possible — is lacking. We are told that the elements combine to form compounds, and the fact is illustrated by the burning of phosphorus in oxygen, and other similar experiments; but not a particle of evidence, beyond mere assertion, is adduced to show that the action is synthetical rather than metathetical or analytical. The union of two elements in more than one proportion is not proved by appeal to the evidence of the balance, to the value of which the author has paid tribute in connection with the elucidation of the principles of its mechanism; but, instead, we are treated to the following: "We have now to inform and demonstrate to the learner that more than one compound can be formed, in many cases, by the union of the same elements. This will at once be rendered easily intelligible to him if we make use of our former comparison. There are different words composed of the same letters: there are, for instance, two different words composed of the letters *t* and *o*, viz., 'to' and 'too'; the same with the letters *b* and *e*, viz., 'be' and 'bee'; and other examples will at once recur to the student. In like manner, for example, there are two compounds of carbon and oxygen: viz., carbon monoxide, the symbol for which is CO; and carbon dioxide, which, for the present, we will represent by the symbol COO. This latter compound, it will be seen from the symbol, contains double the quantity of oxygen the former contains." This is puerile; but the pendulum swings to the other extreme, and the student, not yet informed as to the laws of combining proportions, the qualities or constitution of acids, bases, or salts, is expected to extract an intelligent idea from descriptions like the following, which, if not taken bodily from "Gmelin's great work of reference," might easily have been so derived, so far as form of statement and assumption of previous knowledge are concerned:—

"The bones being freed from organic matter, and in form of ash, are treated with sufficient sulphuric acid to form an acid phosphate:—



The solution of the acid phosphate is poured off from the insoluble CaSO_4 ; the solution is evaporated to a sirupy consistence; it is then mixed with a sufficient amount of charcoal, evaporated to dryness, and afterward gradually heated to full redness in an appropriate vessel. Two-thirds of the phosphorus distils over, and is condensed by the water contained in the receiving-vessel. The operation may be regarded as consisting of two stages: 1st, the conversion of the acid phosphate; 2d, the setting-free of the phosphorus:—



These examples are sufficient to show the spirit of the book, which is lacking in those qualities of method which have lately begun to appear in elementary chemical literature, and give prom-

ise of the evolution of something more in accord with advanced ideas in matters of education. In our humble judgment, this volume is entirely unsuited to the needs of the modern classroom or laboratory.

A Companion to School Classics. By JAMES GOW. New York, Macmillan. 16°. \$1.75.

Chronological Tables. By ARTHUR C. JENNINGS. New York, Macmillan. 12°. \$1.25.

THE first of these books treats a variety of subjects that students of the classics need to know about, and which cannot be adequately dealt with in the ordinary commentaries. It is divided into five parts, treating respectively of classical texts, the public economy of the Greeks and Romans, the drama, and philosophy. Mythology and geography are not included, doubtless because there are works enough on these subjects already. The Homeric age also is left untouched, on the ground that it is sufficiently illustrated in Professor Jebb's work, and others devoted to that special theme.

The second and third divisions of the work, which deal with public affairs, are the longest, and give an excellent brief description of the Athenian, Spartan, and Roman constitutions, with accounts of the public assemblies and of the various officers of state and their duties. The military and naval establishments are also described, and there are chapters on finance, on chronology, and on weights and measures. In these parts of his work Mr. Gow has presented a vast amount of information in a small compass; yet it is so well arranged and so clearly stated, that, notwithstanding its condensation, it is read with ease and pleasure. Indeed, we do not know where to look for so good an account of Athenian and Roman public affairs, in a form at once clear, concise, and full enough for ordinary students, as Mr. Gow has here given us.

The other parts of the work are of a more scholastic character, especially the first, which gives a brief history of classical texts. First comes a history of the Greek and Latin alphabets; next a description of the mode of writing and of making books in ancient times, followed by a history of classical manuscripts in the middle ages and after the revival of learning; and then a full account of the means and methods of textual criticism. The chapters devoted to these subjects are necessarily somewhat dry; but the information they contain will be useful not only to young students, but to all persons interested in the history of literature. The accounts of the drama and philosophy are briefer than the other portions of the work, but are sufficient for the ordinary purposes of classical students.

From the analysis here given it will be apparent that Mr. Gow's work is different from the other helps to classical study that are now so abundant; and it contains so much that is excellent, that we hope to see it introduced into the schools of this country. Of course, in a work dealing with so many subjects, and necessarily touching many controverted points, it is difficult to secure unimpeachable accuracy; and we can well believe the author when he says that he has found the preparation of the work extremely difficult. Nevertheless, its accuracy, so far as we have been able to test it, is of a high order; while in style and arrangement it is much superior to most of the works with which it is naturally compared.

Mr. Jennings's work is a synchronistic arrangement of the chief events of ancient history, and will be a useful companion to all students of the ancient world. It is not confined to Greek and Roman affairs, though these necessarily occupy the foremost place, but gives also the dates of the leading events in Jewish, Egyptian, and Assyrian history, and of some specially important occurrences in India and China. The tables are arranged in six columns, dealing respectively with political history; Jewish church history; wars, popular movements, catastrophes; biography and topography; inventions, discoveries, science, art; laws, literature, drama, institutions. The chronology ranges from the received date of the foundation of Rome, 753 B.C., down to the Christian era. In regard to very many facts of ancient history, exactness of date, as the author remarks, is unattainable; and he has thought it best to adhere in the main to the schemes of chronology usually found in dictionaries of dates, and other educational works. The special excellence of the work lies, of course, in its parallel presentation of

events in many nations, and in many different departments of human activity; and in this respect it has eminent advantages over most other chronological works.

We should add that both the works here noticed are provided with elaborate indexes, which greatly enhance their usefulness.

Physical and Industrial Training of Criminals. By HAMILTON D. WEY. (Monographs of the Industrial Education Association, Vol. I. No. 3.) New York, Industr. Educ. Assoc.

AMONG the many innovations in penal science introduced at the New York State Reformatory, there is perhaps none with so great an interest to the scientist and the educator as the experiment of reaching the unresponsive intellects of refractory and stupid criminals through their muscles. This experiment, noticed in these columns some time ago, carried with it the proof of its success. It was due to the author of this pamphlet, Dr. H. D. Wey, physician to the reformatory at Elmira. In the present pamphlet Dr. Wey rehearses this experiment, and surrounds it with a valuable analysis of the criminal character, — the only sound basis of true and lasting reform. He here portrays the deviation of the psychophysical organism of the criminal from that of his more fortunate fellow-men, and deduces from it the sound conclusion that the only method of restoring the criminal to a worthy place in the community is to re-organize that fundamental re-action between an individual and his environment that makes crime tempting. For this purpose one must educate the criminal, and that not only in the usual sense of literary instruction, but with the additional meaning of re-forming the habits of his body and mind; and when, in especially dull and sluggish men, it was found that a direct appeal to the will and the intellect was unsatisfactory, the logical step was taken of treating the muscles, the physiological organs of the will: for modern physiology tells us that in muscular exercise we develop not only the muscle, but, more important, the nerve-cell that controls its action; we are building brain and power alike. Such a purely physical training brought the average marks of a dozen most unpromising men for purely intellectual studies from 46 per cent to 71 per cent. The effect is immediate, and, if the treatment is sufficiently prolonged, is lasting.

The second portion of the pamphlet is devoted to the industrial system at Elmira. Idleness is the source of a good share of the world's misery; and every moment of a prisoner's life ought to be systematically occupied. Moreover, the work should be made as interesting as possible, not assume the air of a task imposed as a process of torture. Add to this, that the industrial training must be such as to fit the liberated man to earn his livelihood, and at once (for it is immediately after liberation that the greatest danger exists), and it seems to follow as a necessary deduction that the reformatory workshop must approximate to the real hives of production in the surrounding world. In addition, the educational value of manual training is to be made a special point. This is what the reformatory at Elmira is attempting to do; and the success of the enterprise, after it is properly understood both by the men themselves and by the public, seems beyond question. This monograph, it is hoped, will be the means of extending the sound teachings and practices in vogue at the New York Reformatory.

Negro Myths from the Georgia Coast. By CHARLES C. JONES, Jun. Boston, Houghton, Mifflin, & Co. 12°.

THE title of this book is not quite correct, for the tales told in it are not myths, but fables. Some such stories had already been collected by other writers; but Mr. Jones has found in the swamp region of Georgia and the Carolinas a comparatively unknown field, in which he has gleaned much that is new. The stories are told in the *patois* of the negroes themselves; which seems to us a mistake, as they are not only harder to read, but less interesting, than they would be in correct English. Moreover, many of the linguistic peculiarities are mere mispronunciations, while others are contractions such as we all use in conversation, and only a few are real dialectical characteristics.

The characters in the fables are mostly animals, the rabbit being the favorite, while the wolf and the alligator are frequently introduced. The stories show not a little ingenuity and humor, and some of them are quite entertaining. One of the best is that about

the monkey who didn't know what trouble was, and who went to the Devil to find out. The Devil gave him a closed bag, and told him to go out into the midst of a large field near by, and then open the bag, and he would find an answer to his inquiry. The monkey obeyed, and when he had reached the middle of the field opened the bag, when out jumped a bull-dog. The monkey started and ran, and the dog ran after him until they reached a wood, when the monkey succeeded in climbing a tree, but not without the loss of his tail. The dog staid by the tree and watched till he was hungry, and had to go off in search of food. Then the monkey came down and went home to his wife, telling her that he had had enough of trouble. The moral is obvious: never search for trouble, but wait till it comes to you.

Besides the fables, a few other stories are given, the most important being those relating to the negro belief in spirits, fetiches, and charms. These show, what was already known from other sources, that the Southern negroes are hardly less superstitious in some respects than their African ancestors, and that a great deal will have to be done to raise them to the level of civilization.

Lessons in Geometry, for the Use of Beginners. By G. A. HILL, A.M. Boston, Ginn. 12°.

THIS admirable little book is a grammar-school geometry, and as such lies midway between the courses in geometrical drawing followed in some of our city schools, and a course in ordinary demonstrative geometry. It is intended to follow the study of arithmetic. The method followed is in great part that of question and answer. Each new idea is put in very simple language. Definitions are carefully explained, and in many cases illustrated by cuts. In short, every difficulty which the pupil is likely to meet with seems to have been anticipated. The few demonstrations that are given are all based on the method of equal triangles. The most important feature of the book is the large number of exercises. Of these, those which involve the metric system are separated from the others, and can be omitted if desired. A cheap case of drawing-instruments accompanies the book. The book is adapted to the needs of every grammar-school in the country, and could with advantage be used in all of them. For practical knowledge gained, few branches would better repay the time devoted to the study of this book. It is printed in the elegant style in which the publishers are accustomed to issue their works. G. W. SAWIN.

Trigonometry for Beginners. By Rev. J. B. LOCK, M.A. New York, Macmillan, 1886. 16°. 60 cents.

THIS little book is an abridgment of the 'Elementary Trigonometry' by the same author. Very little knowledge of geometry is assumed. Some points, such as the circular measure of an angle, the fact that the ratios depend only on the magnitude of the angle, and the explanation of tables, are much better put than it is customary to find them. The book also contains a very large number (about seven hundred and fifty) of exercises, which are much better chosen than those in the trigonometries in common use, those in formula-work being particularly good. These exercises, together with the low price of the book, make it especially valuable as a secondary treatise for teachers who are using another textbook. The book is too small for the amount it contains, and as a consequence its pages are much crowded.

Geometry in Space. By R. C. J. NIXON, M.A. Oxford, Clarendon Pr. 12°. (New York, Macmillan, 90 cents.)

THIS is a brief treatment of solid geometry, modelled on that of Euclid. A short introduction on perspective is prefixed, however, and some modern ideas are introduced, such as anharmonic ratio, similitude, inversion, and poles and polars, these subjects being very briefly treated. The number of exercises is also large. A chapter on the geometrical theory of perspective is appended. The book is well printed, but would be much improved if the type were larger.

NOTES AND NEWS.

THE third part of the annual report of the Geological Survey of Pennsylvania has just been issued. It treats of the operations in the anthracite-coal region, and is accompanied by an atlas, embracing the coal-region, and based upon the triangulation of the United

States Coast Survey. The report contains, besides the results of geological surveys, valuable statistics of the production and shipment of anthracite coal for 1885 and 1886. At the same time have been issued the atlas-sheets embracing Bucks and Montgomery Counties.

— Ch. Montigny was led by an occasional observation to the study of the scintillations of stars and their relations to atmospheric disturbances. On Dec. 7, 1886, he noticed, during his observations at Brussels, that the scintillations of the stars suddenly increased, although the meteorological instruments showed no change whatever. A few hours later, however, the barometer began to sink, and a gale arose which lasted for two days. This led the observer to the conclusion that the high strata of the atmosphere were disturbed hours before the instruments were in any way affected. A thorough investigation of observations showed that this was of frequent occurrence, and that the scintillations also continued after the storm had passed. Besides this, they were the stronger the fiercer the storms raged, and the nearer the minimum passed the place of observation.

— The 'Second Annual Report of the Meteorological Institute of Roumania for the Year 1886' is a valuable contribution to our knowledge of the climate of south-eastern Europe. It contains only the results of observations made at Bucharest, although a considerable number of stations of the second order have collected meteorological data, the appropriations being insufficient for their publication. The director of the institute, Prof. Stefan C. Hepitos, well deserves the thanks of meteorologists for the valuable work he has done, the amount of which is astonishing, considering that all has been done with an annual appropriation of less than \$2,400. He sets forth an interesting plan of increasing the number of stations and of a thorough study of the climatic elements of Roumania, which, if carried out, would give us the much-desired data on the meteorology of that region.

— The Prince of Monaco has published several preliminary papers on the results of the cruises of his sailing yacht 'L'Hirondelle.' In 1885 her course was from Lorient to Cape Finisterre and the Azores, whence an excursion was made north-westward as far as 44° north latitude. Having returned to the Azores, she sailed north-north-west as far as 50° north latitude, and then returned to Lorient. In 1886 the prince sailed westward from Cape Finisterre until he reached the twentieth degree west from Paris, which he followed to 50° north latitude. The special object of this cruise being to ascertain the connection of the currents of the Bay of Biscay with those of the Atlantic, a great number of floats were immersed on this route, part of which were found again, thus furnishing valuable material regarding the currents of the North Atlantic. The last cruise was even more extended than the first ones. Starting from the Azores, the prince followed a straight line to Newfoundland, thus crossing the Gulf Stream drift. On this line 931 floats were set adrift. At the same time, soundings, bathythermometrical readings, and dredgings were made. Attention was paid to the subject of fisheries, particularly to that of the sardine, which was formerly so abundant on the French coasts, while it has now almost disappeared.

— Prof. F. W. Clark of the National Museum will make a unique collection of mineral species for exhibition at the Cincinnati Exposition. A portion of the twenty-five thousand dollars appropriated by Congress to enable the Government of the United States to participate in that exposition has been placed at Professor Clark's disposition, and he will supplement the specimens he will select from the museum collection with others obtained especially for this occasion. The collection will be of great scientific value.

— *Petermann's Mittheilungen* for May publishes a full account of Captain van Gèle's exploration of the Obangi, accompanied by a map which has been constructed by B. Hassenstein, who reduced Junker's observations in the country adjoining the upper Welle. He calls attention to the important fact that Junker learned of the existence of a chief called Bangusso four days' journey west from Singio. Van Gèle discovered a northern tributary of the Welle, which was called by the natives Bangasso as coming from Bangas-

so: therefore it is probable that Van Gèle's Bangasso is the lower course of Junker's Mbomo, on the banks of which Bangusso's village is situated. In this case the Kutu would prove to be a tributary of the Mbomo. Since the great discoveries in the basin of the Kassai no expedition has helped more to make clear the hydrography of Central Africa than Van Gèle's, the limits of the Kongo watershed being now pretty well known.

— The Linnæan Society held its centenary celebration May 24, according to *Nature* of that date. The following eulogia were pronounced: on Linnæus, by Prof. Thöre Fries, the present occupant of the chair of botany at Upsala; on Robert Brown, by Sir Joseph Hooker; on Charles Darwin, by Professor Flower; on George Bentham, by Mr. W. T. Thiselton Dyer. The Linnæan gold medal, instituted by the society on the occasion of its centenary, was presented to Sir Joseph Hooker (botanist) and Sir Richard Owen (zoölogist). In subsequent years the presentation will be alternately to a botanist and zoölogist.

— 'Popular Physics,' by J. Dorman Steele, Ph.D. (A. S. Barnes & Co., publishers, New York), forms the third of a new series, upon the sciences. Many of the features of its parent book, 'Fourteen Weeks in Physics,' will serve to identify this new work. — T. Fisher Unwin, 26 Paternoster Square, London, announces a second edition, revised and rewritten on the basis of the first edition by Edward Newman, of 'Birdsnesting and Bird-skinning,' — a description of the nests and eggs of birds which breed in Britain; with directions for their collection and preservation, a chapter on bird-skinning, and description and woodcuts of the instruments necessary to the collector, — by Miller Christy. — Messrs. James W. Queen & Co., Philadelphia, have just issued a new and very complete edition of their catalogue of electrical testing apparatus. This covers nearly every form of apparatus called for in a well-equipped electrical laboratory.

— In the June *Andover Review* Dr. Bemis continues his papers on immigration, pointing out in the present number the distribution of our immigrants. The experiment at Harvard in solving the problem of the relation of religion in its outward form to university life, is clearly stated by Rev. D. N. Beach. Professor James of the University of Pennsylvania gives an account of the requirements for the degree of Ph.D. in German universities. — *The American Garden* for June is a special rose number. — The approaching 'heated term' renders an article on 'Summer Indigestion and Diarrhœa' in the current number of *Babyhood* seasonable.

— It is not often that a part of Edwards's superb 'Butterflies of North America' appears with so much interesting matter in it as is found in the fifth number, just issued. A rare form of Californian *Melitæa* is figured, — of which all efforts to obtain the early stages have so far been unsuccessful, — two species of *Erebia* from the Rocky Mountains, and our eastern *Portlandia*. The plate of the latter is crowded with figures of early stages in most exquisite delineation. Although figured long ago by Abbot, his drawings, published by Boisdual & LeConte, were among the worst he ever made, so as to be quite misleading; while Mr. Edwards figures also the egg and every stage of the caterpillar, — a thing the more difficult to do, as it hibernates in the middle of its larval life. The text gives a complete history of this interesting and excessively local species, the habits of which are described in very different terms by different observers. But the most interesting of all is the plate of *Erebia*, which figures, as we have said, two species, giving for one of them the egg and earliest stage of the caterpillar; the latter never before figured or described for this genus, although thirty or forty species are known in Europe. That it should finally be made known by a naturalist in Eastern America, where it is unknown, is a curious commentary on the zeal of our transatlantic brethren. The species has been taken only by one collector, and only at a height of from twelve thousand to fourteen thousand feet on the front range of the Rocky Mountains in Colorado, where the ground is covered by broken black rocks, above which the butterfly, which is of a deep black color, rarely rises far, and upon which when alighted it can scarcely be detected. When we learn from the cover that the expense of the preceding number was only

partly covered by a grant from the Elizabeth Thompson science fund (the first help the author has had), we can gauge to some extent our past pecuniary indebtedness to the indefatigable author, who steadily issues these incomparable iconographs.

— W. William Topley, general secretary of the committee on organization of the coming (fourth) session of the International Geological Congress in London, desires that all scientific societies, libraries, institutions of learning, and individuals having any interest in the publications relating to the purpose of the congress, and the volume of its Proceedings containing the reports, papers, maps, etc., should secure these publications at the trifling cost of the membership fee to the congress, of ten shillings, or about two dollars and a half. For every such sum sent to him at the museum, 28 Jermyn Street, London, the sender, whether an institution or an individual, will receive all the documents which it or he would receive were the sender actually present as a member of the congress. Some of these publications, not to speak of the volume, will be of great value, and cannot be otherwise procured. Address William Topley, Esq., general secretary International Congress of Geologists, Museum, 28 Jermyn Street, London. The volumes of previous sessions of the congress alone are now difficult to procure at twice this cost, or more.

— The Royal Society of Canada has, since its establishment, done much to promote the interests of science in the Dominion. In his annual address delivered at the recent meeting which was held in Ottawa May 22–24, the president, Dr. Lawson of Halifax, reviewed the work of the society during the past year. The Transactions of the society for 1887 fill a large volume; although, of seventy papers which were presented, only forty were printed, the rest being kept back by the authors for the purpose of being perfected by additional work. He called attention to the preponderance of papers in the geological and biological section over those in the sections of English and French literature, which had increased more and more, showing the greater interest taken in science as compared to history and philology. In the course of his address he urged the granting of aid from the British Parliament for the purpose of making observations of tides and currents. This would not only be of substantial value to the shipping community, but would be a benefit to the country at large. A committee was appointed to co-operate with the British Association in pressing the necessity of such observations upon the Parliament, but so far no practical result has followed. A scientific federation of the empire, which was being agitated under the auspices of the Royal Society in London, also engaged attention, and was considered a matter of the greatest importance, in view of the aid that could be given to a geological survey of the Dominion. A committee appointed to inquire into the matter reported favorably on the subject, and the council of the Royal Society was given permission to act upon this report. On Friday the sections presented their reports. The section for French literature stated that they had decided to establish a fund of ten thousand dollars for a prize at the French Academy, to be called 'The New France Prize;' the interest, three hundred dollars, to be given in annual prizes to the author of the best work in French, to be published in France or Canada, on a subject to be determined by the academy. Sanford Fleming was elected president for the ensuing year.

LETTERS TO THE EDITOR.

** * * Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

Genealogy of Ideas.

In the study of the genealogy of ideas there is a series of questions which have sprung up as corollaries to the problems involved in similarities. In Col. Lane Fox's exhibition of weapons, structure is the fundamental concept. All weapons of the same plan of structure are in the same row. The second concept is complexity of form and structure, and the pieces are arranged in their row according to their elaboration, the worst on the left. No good

anthropologist would argue from this order that the row represented a genealogical line, in which each one at the right is child of the one immediately on its left. The only safe conclusion is, that the history of invention has travelled somewhat in this manner.

The corollary to all this is, that arranging the arts of different races in such a developmental series gives us a fair means of gauging these races in the scale of excellence and advancement. If people A are found in the whole group of series to stand on the left of people B, then they are an inferior people. If, on the contrary, we make ourselves A, and, comparing our inventions and institutions of all kinds with those of B, we discover that we stand on the right rather than on the left, there should be no hesitation in rating ourselves accordingly.

The next corollary is, that we cannot neglect historical studies. Genealogies are to be traced historically. The Russian banjo did not descend from the Aleut banjo, but really descended to it, and shows that which occurs again and again in arts and institutions, the degradation of invention.

O. T. MASON.

Washington, May 30.

New York Schools.

AFTER investigating the English musical system known as the Tonic-Sol-Fa, and finding its great superiority to the staff method, which I had taught for twenty years, I naturally sought to interest music-teachers and educational people in the system. For this purpose I had several interviews with Superintendent Jasper. My reception from him was about as cordial as if I had been the vendor of a quack nostrum. At last he settled the question by saying very emphatically, "Mr. Seward, I am *opposed* to the Tonic-Sol-Fa System!" As he knew nothing about it, and refused to give any attention to the overwhelming testimony of English and American teachers, in favor of the system, I was led to ask myself what progress could possibly be made by the New York schools in any direction under the control of such a superintendent.

THEODORE F. SEWARD.

East Orange, N. J., May 30.

YOUR editorial note in the issue of your paper for May 25, discussing the system employed in the New York public schools and the relation of the present superintendent to it, ought to have been read by every teacher in New York City. The truth is, that barnacles by the score are nourished and fattened by the present state of affairs, and all their powerful influence is enlisted against any change. The publishers and the politicians run the schools at present, and neither publishers nor politicians hesitate to use corrupt and debasing means to attain their ends. One man who knows as well as any one else — if not better than any one else — how thoroughly rotten and inefficient the present administration is, takes the stand, and calmly testifies that it is scholastically perfect and sound! Why? Because his text-books are used, and he fears their being displaced by others if a new *régime* is inaugurated, or if he offends the "powers that be" at present.

New York's citizens do not understand the present crisis, or there would be an agitation which would put those in favor of high license, clean streets, or home rule into a dismal shade. The minds and manners of nearly two hundred thousand children are involved. Can nothing be done?

A PROFESSIONAL OBSERVER.

New York, June 1.

Answers.

32. HUMAN BEINGS AS PACK-ANIMALS. — Referring to my friend Professor Mason's query No. 32, I beg to refer him to Darwin's 'Voyage of the Beagle,' Chapter XVI., pp. 340 and 341, for a capital account of the 'duty' of men used as-beasts of burden. The passage is too long to quote here, but any one interested can easily turn to it. The Chinese porters of San Francisco would furnish him with examples of high 'duty' also. I regret that I cannot give numerical estimates. I can only say that loads which I have vainly tried to lift from the ground were carried by undersized Chinese at quite a rapid walk. In many cases such loads are carried up and down hills too steep to drive upon.

EDWARD S. HOLDEN.

San José, Cal., May 28.